Recall that the cosecant function is defined as the reciprocal of the sine function: $\csc(x) = \dfrac{1}{\sin(x)}$. In this problem, we will find some properties of the cosecant function.

Exercise **1** (a) *Recall that* $\sin(x) = 0$ *when* x *is a multiple of* π: $\ldots, -2\pi, -\pi, 0, \pi, 2\pi, 3\pi, \ldots$. *Select the domain of the cosecant function.*

Multiple Choice:

(i) $(-\infty, \infty)$

(ii) $(-\infty, 0) \cup (0, \infty)$

(iii) $\cdots \cup (-2\pi, -\pi) \cup (-\pi, 0) \cup (0, \pi) \cup (\pi, 2\pi) \cup \cdots$ ✓

(iv) $\cdots \cup \left(-\dfrac{5\pi}{2}, -\dfrac{3\pi}{2}\right) \cup \left(-\dfrac{3\pi}{2}, --\dfrac{\pi}{2}\right) \cup \left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right) \cup \left(\dfrac{\pi}{2}, \dfrac{3\pi}{2}\right) \cup \cdots$

(b) *Recall that sine is an odd function. Cosecant is*

Multiple Choice:

(i) *odd.* ✓

(ii) *even.*

(iii) *odd and even.*

(iv) *neither odd nor even.*

(c) *On the interval* $\left(0, \dfrac{\pi}{2}\right)$, *cosecant is*

Multiple Choice:

(i) *increasing.*

(ii) *decreasing.* ✓

(iii) *neither increasing nor decreasing.*

(d) *Using knowledge of famous angles,* $\csc\left(\dfrac{\pi}{3}\right) = \boxed{\dfrac{2}{\sqrt{3}}}$.

(e) *Which of the following graphs is the graph of* $\csc(x)$?

Multiple Choice:

(i) *A* ✓

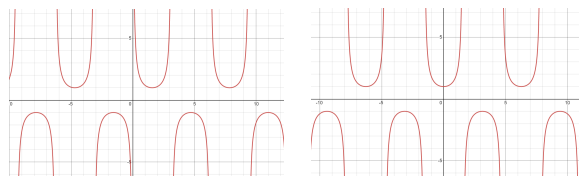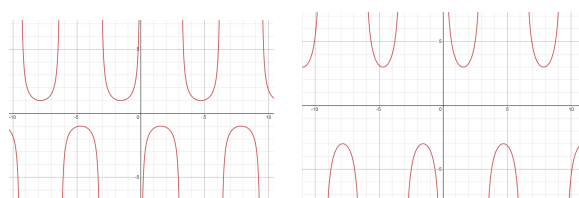(ii) *B*

(iii) *C*

(iv) *D*

Figure 1: A on the left and B on the right

Figure 2: C on the left and D on the right